Commonwealth Edison Company
1400 Opus Place
Downers Grove, IL 60515

June 8, 1995

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ComEd

Attn: Document Control Desk

Subject: Supplement to Technical Specification Amendment Request for Section 3.4.9.3
Braidwood Units 1 and 2
NRC Docket Numbers 50-456 and 50-457

References:

1. D. Saccomando letter to Nuclear Regulatory Commission dated December 16, 1995, transmitting Request to Amend Technical Specification 3.4.9.3

2. R. Assa letter to D. Farrar dated April 20, 1995, transmitting Request for Additional Information

3. D. Saccomando letter to NRC dated May 5, 1995, transmitting Braidwood's Response to Request for Additional Information

In Reference 1 Commonwealth Edison Company (ComEd) Braidwood Station transmitted a proposed Technical Specification amendment to Section 3.4.9.3 and the associated bases. Review of that amendment request resulted in the Nuclear Regulatory Commission (NRC) transmitting a Request for Additional Information (RAI) via Reference 2. Braidwood's partial response to the RAI questions was transmitted in Reference 3.

As a result of the RAI questions and their response, Braidwood Station recognized that the amendment request needed to be modified to include instrument uncertainty and new capsule surveillance data. Please note that inclusion of the instrument uncertainty does not result in changes to the associated bases. The Attachment supersedes the previous amendment that was submitted in Reference letter 1. Also included, in Attachment F, is ComEd's completed response to the RAI questions.

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This package includes:

Attachment A: Description and Safety Analysis of Proposed Changes

Attachment B: Proposed Revision to the Technical Specifications

Attachment C: Evaluation of Significant Hazards Considerations

Attachment D: Environmental Assessment

Attachment E: Tables and Graphs

Attachment F: Review of Questions and Responses from April 20, 1995, Request for Additional Information

ComEd requests that this proposed amendment be approved prior to July 28, 1995. Unit 1 is currently predicted to reach 5.37 EFPY on August 2, 1995.

To the best of my knowledge and belief, the statements contained in this document are true and correct. In some respects these statements are not based on my personal knowledge, but on information furnished by other ComEd employees, contractor employees, and/or consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

Please address any further comments or questions regarding this matter to this office.

Sincerely,

OFFICIAL SEAL
MARY JO YACK
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES: 11/29/97

Denise M. Saccomando
Nuclear Licensing Administrator

Attachments

Mary Jo Yack 6-8-95

cc: R. Assa, Braidwood Project Manager-NRR
S. Dupont, Senior Resident Inspector-Braidwood
J. Martin, Regional Administrator-RIII
Office of Nuclear Facility-IDNS

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ATTACHMENT A

DESCRIPTION AND SAFETY ANALYSIS OF
PROPOSED CHANGES TO APPENDIX A
TECHNICAL SPECIFICATIONS OF
FACILITY OPERATING LICENSES
NPF-72 AND NPF-77

A. DESCRIPTION OF THE PROPOSED CHANGE

Commonwealth Edison (ComEd) proposes to revise Figure 3.4-4a, "Nominal PORV Pressure Relief Setpoint Versus RCS Temperature For The Cold Overpressure Protection System Applicable up to 5.37 EFPY (Unit 1)," of Technical Specification (TS) 3.4.9.3. The index page entry associated with Figure 3.4-4a will also be changed to reflect the changes in Figure 3.4-4a. This amendment request supersedes ComEd's December 16, 1994 amendment request on the same subject, and is in response to question 3 of the Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI) of April 20, 1995.

B. DESCRIPTION OF THE CURRENT REQUIREMENT

The current index page VIII states that Figure 3.4-4a is applicable to 5.37 Effective Full Power Years (EFPY) for Unit 1.

Figure 3.4-4a describes the nominal Pressurizer Power Operated Relief Valve (PORV) setpoints for the Low Temperature Overpressure Protection System (LTOPS) as a function of reactor Coolant System (RCS) temperature. The current Figure 3.4-4a contains a 60 pounds per square inch gauge (psig) pressure instrument uncertainty, a 13°F temperature instrument uncertainty, a 14°F temperature streaming allowance, and an allowance for the 50°F thermal transport effect associated with the postulated heat injection transient. Figure 3.4-4a also contains an administrative limit line at 638 psig which limits the maximum setting of the PORV in the LTOPS mode to protect the PORV discharge piping from water hammer effects on PORV opening and closing with the RCS and pressurizer in a water solid condition.

C. BASES FOR THE CURRENT REQUIREMENT

The setpoints provided for the LTOPS are selected such that the pressure peaks resulting from design basis overpressure events are limited to values less than those specified by Appendix G of Title 10 Code of Federal Regulations Part 50 (10 CFR 50), which incorporates by reference American Society of Mechanical Engineers (ASME) Section XI Appendix G. NUREG-0800, "Branch Technical Position MTEB 5-2," (NUREG-0800 BTP 5-2) also provides guidance in this area.

In March of 1994, ComEd submitted an amendment request for a new Figure 3.4-4a to replace a figure that expired at the end of 4.5 EFPY.

In June of 1994, a supplemental request was submitted to the NRC. The June 1994 supplemental submittal adjusted the curve submitted in the March 1994 request to account for a 50^0F thermal transport effect on the postulated heat injection transient which Westinghouse had inadvertently left out of the March 1994 curve. In July of 1994, the curve was revised again at the NRC's request to account for a 60 psig pressure instrument uncertainty. This necessitated reducing the duration of applicability of Figure 3.4-4a from 32 EFPY to 5.37 EFPY, and adding a 638 psig administrative limit line to protect the PORV discharge piping from water hammer effects on PORV opening and closing with the RCS and pressurizer in a water solid condition.

D. NEED FOR REVISION OF THE REQUIREMENT

Currently, Figure 3.4-4a is valid until Braidwood Unit 1 reaches 5.37 EFPY. In addition, the current Figure 3.4-4a contains an administrative limit line at 638 psig to protect the PORV discharge piping from water hammer effects on PORV opening and closing with the RCS and pressurizer in a water solid condition. In order to extend the duration of applicability for Figure 3.4-4a, and remove the administrative limit line it is necessary to revise the current Figure 3.4-4a.

The TS index page will be revised to reflect the changes to Figure 3.4-4a.

E. DESCRIPTION OF THE REVISED REQUIREMENT

The current Figure 3.4-4a, "Nominal PORV Pressure Relief Setpoint Versus RCS Temperature For The Cold Overpressure Protection System Applicable up to 5.37 EFPY (Unit 1)," will be replaced with a new Figure 3.4-4a, "Nominal PORV Pressure Relief Setpoint Versus RCS Temperature For The Cold Overpressure Protection System Applicable up to 16 EFPY (Unit 1)."

That portion of the revised Figure 3.4-4a limited by the Appendix G Pressure Temperature (PT) limits retains the 60 psig pressure instrument uncertainty, the 13°F temperature instrument uncertainty, and the 50°F thermal transport effect for heat injection events.

For that portion of the revised Figure 3.4-4a limited by the 800 psig PORV discharge piping limit, the 60 psig pressure instrument uncertainty is retained, but credit is taken for the elevational difference between the PORV LTOPS pressure sensor and the PORV itself. The 13°F temperature instrument uncertainty and the 50°F thermal transport effect for heat injection events are also retained in this section of Figure 3.4-4a.

The 14°F temperature streaming allowance is not included in the LTOPS setpoint curve since WCAP 14040, "Methodology used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves," Section 3.2.2, "Pressure Limit Selection," assumes LTOPS events are most likely to occur during isothermal conditions in the RCS. Thus, temperature streaming would not be a consideration.

Additionally, the revised curve accounts for the flow induced pressure difference between the pressure transmitter in the RCS loop piping and the reactor vessel midplane, and takes advantage of a 10% relaxation of the maximum allowable RCS pressure in accordance with ASME Code Case N-514. ComEd applied for permission to use the criteria of ASME Code Case N-514 in the determination of LTOPS setpoints via letter dated November 30, 1994, supplemented by a letter dated May 8, 1995.

Finally, the revised Figure 3.4-4a does not contain the administrative limit line at 638 psig.

The TS index page will be revised to reflect the new duration of applicability for Figure 3.4-4a and the format of Figure 3.4-4a will be revised to improve readability.

F. BASES FOR THE REVISED REQUIREMENT

PT limits and LTOPS setpoints are established to protect the reactor pressure vessel (RPV) from nonductile failure due to overpressurization. The determination of the PT limits and LTOPS setpoints is based on very conservative assumptions and methodologies.

In addition to the basic conservative assumptions and methodologies used to develop the PT and LTOPS curves, the current Figure 3.4-4a contains a 60 psig pressure instrument uncertainty, a 13°F temperature instrument uncertainty, a 14°F temperature streaming allowance, and a 50°F thermal transport effect allowance for the postulated heat injection transient. The current Figure 3.4-4a also contains an administrative limit line at 638 psig to protect the PORV discharge piping from water hammer effects on PORV opening and closing with the RCS and pressurizer in a water solid condition.

As the basis for generating the revised Figure 3.4-4a, a revised steady state 10 CFR 50 Appendix G PT limit curve was generated for 16 EFPY using the data from WCAP 14241, "Analysis of Capsule X from the Commonwealth Edison Company Braidwood Unit 1 Reactor Vessel Radiation Surveillance Program," and WCAP 12685 "Analysis of Capsule U from the Commonwealth Edison Company Braidwood Unit 1 Reactor Vessel Radiation Surveillance Program." These documents were submitted to the NRC on March 21, 1995, and October 22, 1990 respectively.

A comparison between the capsule specimens, and the limiting RPV material (beltline weld) in accordance with Section 2.1 of Regulatory Guide (RG) 1.99, "Radiation Embrittlement of Reactor Vessel Materials," has demonstrated that the capsule specimen chemistry is identical with the RPV limiting material with respect to copper nickel content. Thus, no adjustment to measured values ΔRT_{NDT} is required.

The revised steady state 10 CFR 50 Appendix G PT limit curve includes allowances for the effects of the flow induced pressure difference between the LTOPS pressure sensor and the RPV beltline, and incorporates a 10% relaxation of the maximum allowable RCS pressure limit in accordance with ASME Code Case N-514. ComEd applied for permission to use the criteria of ASME Code Case N-514 in the determination of LTOPS setpoints via letter dated November 30, 1994, supplemented by a letter dated May 8, 1995.

To determine the flow induced differential pressure effects between the RCS loop piping and the reactor vessel midplane, the following cases were considered:

1. 4 Reactor Coolant Pumps (RCP) and 0 Residual Heat Removal (RHR) Pumps operating with RCS temperature greater than or equal to 350°F.

2. 4 RCPs and 2 RHR pumps operating with RCS temperature between 120°F and 350°F.

3. 1 RCP and 2 RHR pumps operating with RCS temperature less than or equal to 120°F.

The revised 10 CFR 50 Appendix G PT limit curve pressure limits were then adjusted down by the appropriate amount for each temperature range. Also, a constant 800 psig RCS pressure value was selected to control PORV piping loads due to waterhammer effects from PORV actuation during water solid pressurizer conditions. The pressure values on the revised 10 CFR 50 Appendix G PT limit curve, or the 800 psig PORV discharge piping water hammer load limit, whichever was lower at a given temperature, were then used to develop the revised Figure 3.4-4a.

That portion of the revised Figure 3.4-4a limited by the Appendix G PT limit curve retains the 60 psig pressure instrument uncertainty, the 13°F temperature instrument uncertainty, and the 50°F thermal transport effect for heat injection events.

For that portion of the revised Figure 3.4-4a limited by the 800 psig PORV discharge piping limit, the 60 psig pressure instrument uncertainty is retained with credit taken for the elevational difference between the PORV LTOPS pressure sensor and the PORV itself. This elevation difference is approximately 74 feet, so the actual pressure at the PORV discharge will be approximately 32 psig less than the pressure seen by the pressure transmitter. For purposes of incorporating the 60 psig pressure instrument uncertainty in the 800 psig PORV piping discharge pressure limit, the pressure at the PORV was assumed to be 30 psig less than the pressure at the sensor due to elevational differences. A 30 psig instrument uncertainty was then assumed for the PORV LTOPS pressure sensor. The total of the elevational pressure drop and the applied 30 psig pressure instrument uncertainty thus account for the assumed total 60 psig pressure instrument uncertainty. For example, assume that the LTOPS pressure sensor reads 60 psig low. This represents the assumed pressure instrument uncertainty and is in the worst case direction with respect to the 800 psig PORV discharge piping limit. Further, assume the LTOPS setpoint is 600 psig. The following table shows the effect of the elevational difference in this case:

600 psig -	LTOPS sensor output
+60 psig -	LTOPS sensor error; actual RCS pressure
-30 psig -	Pressure drop due to sensor/PORV elevational difference
630 psig -	Pressure at PORV

Thus, due to the elevational difference between the LTOPS sensor and the PORV, the PORV sees a 30 psig instrument error.

The 13°F temperature instrument uncertainty, and the 50°F thermal transport effect for heat injection events are also retained in that section of the revised Figure 3.4-4a limited by the 800 psig PORV discharge piping limit.

The 14°F temperature streaming allowance is not included in the revised Figure 3.4-4a since WCAP 14040, "Methodology used to Develop Cold Overpressure Mitigating System Setpoints and RCS Heatup and Cooldown Limit Curves," Section 3.2.2, "Pressure limit Selection," assumes LTOPS events are most likely to occur during isothermal conditions in the RCS. Thus, temperature streaming would not be a consideration.

The 638 psig administrative limit line for temperatures greater than 250°F has been removed from the revised Figure 3.4-4a. This administrative limit was developed to address an NRC concern. This concern was raised in a teleconference between Braidwood and the NRC regarding Braidwood's July 21, 1994 supplement to a March 30, 1994 request to amend TS 3.4.9.1 and 3.4.9.3. This amendment request proposed a new LTOPS curve that didn't include instrument uncertainties in the 800 psig PORV discharge piping limit.

In the teleconference mentioned above, the NRC expressed concern that beyond the 638 psig point if all instruments were at the high end of their tolerance bands simultaneously, and these values were added together, it was possible to exceed the 800 psig PORV discharge piping limit. Since the original LTOPS curve expired July 30, 1994, the 638 psig interim administrative limit line was determined to be the most expeditious method of addressing the issue. The limit value was arrived at based on the following:

796 psig -	Maximum pressure for LTOPS event - less than 800 psig PORV discharge piping limit.
- 98 psig -	Greatest pressure overshoot for temperatures ≥ 250°F.
- 60 psig -	Random instrument uncertainty.
638 psig -	Administrative limit.

Per standard Westinghouse methodology as described earlier, the 800 psig PORV discharge piping limit is factored into the development of the LTOPS setpoints. A constant 800 psig RCS pressure value is selected to control PORV discharge piping loads due to water hammer effects from PORV actuation during water solid pressurizer conditions. This limit is then adjusted to account for instrument uncertainty and pressure overshoot on PORV lift.

The resulting pressure values from the revised 10 CFR 50 Appendix G PT limit curve, or the adjusted 800 psig PORV piping water hammer load limit, whichever is lower at a given temperature are used to develop the LTOPS PORV setpoint curve.

Since the appropriate instrument uncertainties and pressure overshoots have been included in the application of the 800 psig PORV discharge piping pressure limit employed for this amendment request, the PORV discharge piping is adequately protected and the administrative limit line is no longer needed.

The TS index page entry associated with Figure 3.4-4a is being changed to reflect the change in the duration of applicability of Figure 3.4-4a, and the format of Figure 3.4-4a is being changed to improve readability.

A representation of the revised Appendix G PT limit curve is included in Attachment E along with a table of data points used to develop the curve. This representation is intended to answer questions 1 and 2 of the NRC's RAI of April 20, 1995 which relates to ComEd's December 16, 1994 amendment request. Additionally, a table is provided in Attachment E of the data obtained in ComEd's analysis for the limiting pressure in Appendix G, the limiting pressure allowed by ASME Code Case N-514, the PORV setpoint with instrument uncertainties, the increment of pressure during the limiting transient, and the peak transient RCS pressure at 70°F, 150°F, 200°F, 300°F, and 350°F. This table is intended to answer question 11 of the NRC's RAI of April 20, 1995. Also included in Attachment E is a review of the remaining questions contained in the April 20, 1995 RAI. This review is to provide updated responses to those questions based on this proposed amendment request.

G. IMPACT OF THE PROPOSED CHANGE

The new LTOPS curve will not change any postulated accident scenarios. The revised curve was developed using industry standards and regulations which are recognized as being inherently conservative. No new accident or malfunction mechanism is introduced by this amendment. No changes to the design of the facility have been made, no new equipment has been installed and no existing equipment has been modified or removed. The revised curve provides assurance that the RPV is protected from brittle fracture.

The index page and format changes are purely administrative in nature and are designed to reflect the change in the duration of applicability of Figure 3.4-4a, and improve the readability of Figure 3.4-4a. These administrative changes will have no effect on any equipment, system, or operating mode.

Thus, this proposed amendment will have no negative effect on any system or operating mode.

H. SCHEDULE REQUIREMENTS

ComEd requests that this proposed amendment be approved prior to July 28, 1995. Unit 1 is currently predicted to reach 5.37 EFPY at 5:30 am on August 2, 1995.

ATTACHMENT B

MARKED UP PAGES FOR
PROPOSED CHANGES TO APPENDIX A
TECHNICAL SPECIFICATIONS OF
FACILITY OPERATING LICENSES
NPF-72 AND NPF-77

BRAIDWOOD STATION UNIT 1
REVISED PAGES:

VIII
3/4 4-39*
3/4 4-40

*NOTE: THIS PAGE HAS NO CHANGES BUT IS INCLUDED FOR CONTINUITY.